Description

Method and device for switching a connection in a communication network

The present invention relates to a method and to a device for switching a connection between two subscribers of a communication network, e.g. a telephone network, from an exchange of the communication network, after a request coming from a position outside this communication network, for example from the Internet, using the existing switching functions and signal transmission functions of the communication network.

It is known to initiate a connection between two subscribers of a communication network by the two subscribers being called separately in each case from a special terminal located outside the communication network, a computer as automatic operator. As soon as a connection exists to both subscribers and the special terminal, the information signals and the control signals for service indicators, if any, are then transmitted by this terminal from one connection to the other and conversely. Such a switching method is used in telephone networks in call centers. The disadvantageous factor is the relatively complex implementation and the necessary capacity for high performance required from the special terminal.

Such switching of a connection in telephone networks is of particular interest for the function of "click to dial" out of the Internet. "Click to dial" is an offer in the Internet in which a user of the Internet is provided with the possibility of setting up a connection directly by instruction between two subscriber numbers of the telephone network, the telephone numbers of which are input or retrieved from a database. Both lines involved must be dialed for this

and connected to one another. In most cases, one subscriber is the Internet user himself.

If this function is implemented similar to the call switching in call centers, a controller operating as terminal of the communication network must initiate two connections via the communication network here, too, and, as soon as both connections exist, the controller must forward the information data, that is to say the digitized voice or other data to be transmitted, of one connection via the other one and conversely. To maintain the features offered by the communication system used in the communication network, e.g. the service indicators of the ISDN in the telephone network, for both subscribers of the initially different connections, these, too, must be transferred from one connection to the second one and adapted, if necessary. This creates considerable expenditure since the computer receives the service indicators like a terminal and forwards them again to the second corresponding connection like a terminal. Additional computing effort is produced by the fact that some data have to be converted and adapted. In the ISDN, for example, it is possible to indicate the telephone number of the other subscriber by means of the CLIP feature. Since there are two connections from the point of view of the communication network, the second call must receive from the controller the indicator of the telephone number of the first call instead of that belonging to the controller, in order to guarantee this feature.

It is also desirable to have a capability of integrating the "click to dial" service with the simplest possible means also in existing network nodes in the case where a network operator itself offers this service.

The invention is, therefore, based on the object of

providing a method and a device by means of which it is possible without elaborate adaptations of the transit exchanges and the modules and facilities used in them to establish a connection between two subscribers of the network from one point of the network after a request from a third party.

According to the invention, the object described above is achieved by the features of the independent claims 1 and 9. The dependent claims advantageously develop the basic concept of the invention and provide advantageous embodiments and methods.

According to the invention, according to claim 1, a method for switching a connection between two subscribers in a communication network with a common signaling channel which is independent of the information channels and with transit exchanges consisting of in each case at least one switching network and associated line trunk groups is provided, the switching being effected after the connection has been requested from a third party.

Initially, two inputs for transmission links at a transit exchange are connected by a data line. This can already been done by means of a signal data line. This also results in a permanent allocation of the information data channels in each case in pairs, for example the voice channels in a telephone network. In networks operating with a synchronous digital hierarchy or a plesiochronous digital hierarchy on the transmission links or generally in the case of multiplex lines, in each case at least one information channel of one input is permanently allocated to an information channel of the other input of the transmission link via the corresponding timeslot. Naturally, it is also possible, in an ATM network, to achieve a fixed paired information channel allocation by means of such a hardware connection of the inputs of

transmission links by utilizing the coding and decoding methods provided by the network since for each transit exchange a transmission link, which, in turn, is connected to the exchange itself, acts in such a manner as if it were connected to an adjacent transit exchange. Thus, the methods already in existence produce a fixed information channel allocation since an unambiguous defined information channel allocation must also exist between transit exchanges.

Furthermore, according to the invention, a control signal is transmitted on the common signaling channel, which has the content that a connection is present on one information channel of the information channels in each case permanently allocated to one another, which connection must be switched through to the first subscriber and, at the same time, that a connection is present on the second information channel which must be switched through to the second subscriber. As a result, from the point of view of the communication network, two connections are set up, both of which apparently come from the hardware loop, the connection between the two inputs.

Finally, the incoming terminal signaling of the connection to the first subscriber in one call are forwarded to the connection to the second subscriber via the common signaling channel and conversely.

This can be advantageously carried out with relatively little expenditure even at transit exchanges already existing. Since the junction line is not a terminal and thus does not generate its own terminal signaling, the full extent of the features of the protocol used can already be secured between the terminals by a simple forwarding of the terminal signaling. If, for example, the call number of one subscriber is transmitted via the signaling and forwarded to the other connection via the common signaling channel, the desired result is

obtained without further translation of the signaling. Transmission of the information data does not require any expenditure since the transit exchange in the method according to the invention sees itself as an apparent adjacent transit exchange and, as a result, ensures synchronization of the information channels and transmission of the information data by means of the preexisting methods and devices.

According to claim 2, the ITU-T signaling system No. 7 is advantageously used for the signaling on the common signaling channel.

According to claim 3, the signaling messages of the ISDN User Part (ISUP) are advantageously transmitted from the first connection to the second connection and conversely via the ITU-T signaling system No. 7.

The control signals are advantageously generated by an existing controller of the transit exchange and forwarded to the common signaling channel. As a result, the method described can be applied with little expenditure by a corresponding program without needing an additional controller if the computing power of existing controllers is adequate.

Furthermore, it is advantageous to use as inputs those for transmission links of the PCM30 or PCM 24 type of construction. Since these two types of transmission links are in most cases used in existing transit exchanges, corresponding inputs exist. As a result, it is possible in a relatively simple way to apply the method described to transit exchanges already in existence.

According to the invention, a connection can be initiated in manner by a request from another communication network. For this purpose, a program installed on a computer which is connected to this

other communication network issues the instruction for setting up the connection. In particular, the "click to dial" feature can thus be implemented if the other communication network is the Internet.

According to claim 9 of the invention, a device in a transit exchange is also provided for switching a connection between two subscribers in a communication network. The communication network exhibits a common signaling channel which is independent of the information channels. Furthermore, this is a communication network with transit exchanges consisting of in each case at least one switching network and associated line trunk groups.

At least one pair of information channels is permanently allocated for information data by at least one connection between two inputs for transmission links at the transit exchange by means of a data line.

Furthermore, the device consists of a controller (CTD controller) which is connected to the common signaling channel and which conducts on the common signaling channel a control signal having the content that a connection is present on one information channel of the information channels in each case permanently allocated to one another, which connection must be switched through to one subscriber, and that a connection is present on the second information channel of the information channels in each case permanently allocated to one another, which connection must be switched through to the second subscriber. The controller forwards the terminal signaling of the connection to the first subscriber to the connection to the second subscriber and conversely.

Advantageously, a connection between two subscribers of the communication network can be set up with only little expenditure since it is only the computing

effort for generating the signals of the common signaling channel and the transmission of the terminal signaling by the controller which must be produced. The transit exchange in the device according to the invention sees itself as an apparent adjacent transit exchange and the synchronization of the information data and the permanent allocation of the information channels is thus effected with the existing means of the transit exchange.

The device can also advantageously be installed in preexisting transit exchanges.

The controller advantageously uses the signaling protocol according to the ITU-T signaling system No. 7.

According to claim 11, the controller advantageously transmits the end-to-end signaling messages of the ISDN User Part (ISUP) from one connection to the other one and conversely.

It is also advantageous to provide a data line between two inputs for PCM30 transmission links.

It is also advantageous to provide a data line between two inputs for PCM24 transmission links.

The device can be simplified if the controller (CTD controller) is an existing controller of the transit exchange.

According to claim 15, according to the invention, it is advantageous to provide the device in a transit exchange of the EWSD system. The inputs are then connected by two inputs for PCM lines in each case being connected at one line trunk group (LTG-C).

The group processor of the access section of the transit exchange according to the EWSD system can be

provided as controller (CTD controller). Advantageously, no external additional controller is then needed since the one existing in the line trunk group has sufficient capacity also to serve as controller of the device proposed here.

The controller can be connected to a computer which, in turn, is connected to another communication network in order to initiate the connection by a program on this computer after a request from the other communication network.

The other communication network is advantageously the Internet and the "click to dial" feature is implemented thereby.

In the text which follows, the invention will be explained with reference to figures 1 and 2, in which:

figure 1 shows in a diagram the connection of two subscribers by a third party according to the prior art, by a computer as terminal of the network.

figure 2 shows in a diagram the connection between two subscribers by a third party by means of the device according to the invention,

figure 3 shows in a greatly simplified manner an embodiment according to the invention of the device in a transit exchange EWSD.

Figure 1 diagrammatically shows in accordance with the prior art the switching of a connection in a communication network by a computer connected to the communication network as terminal which is used as automatic operator 9. The communication network consists of transit exchanges 3 and some access exchanges 4. An exchange center can have both functions

and can be both transit exchange 3 and access exchange 4. The transit exchanges are connected to one another by means of transmission links which have at least one information channel 5 and at least one separate signaling channel 6. Figure 1 shows the connection between a first subscriber 7 and a second subscriber 8 by the automatic operator 9. The automatic operator 9 first dials both subscribers 7, 8 in two separate connections via two terminal lines 14. In the example shown, both connections initially take the same path. From the access exchange 4 of the automatic operator 9, they first reach the same transit exchange 3. Depending on the subscriber 7, 8 dialed, the connections can also take separate paths through the communication network after the access exchange 4 to which the automatic operator 9 is connected. In the transit exchange 3, the two connections are switched through completely independently as two different ones. This happens by the information channels 5 and signaling channels 6 being conducted via line trunk groups 2 in the transit exchange 3 and being switched through in a switching network 1 according to the control signals in the signaling channels 6.

If the two connections to the first subscriber 7 and second subscriber 8 have been established, the automatic operator 9 connects the two connections.

Figure 2, in contrast, shows by way of example the arrangement of a device according to the invention for switching a first subscriber 7 and a second subscriber 8 in an embodiment with request of the connection by a network server 13, for example of the Internet. The drawing also shows an embodiment in which the device according to the invention is integrated in a transit exchange 3. In a transit exchange 3 consisting of the main modules switching network 1 and line trunk groups 2, two transmission links are connected by a data line 12 and thus at least two information channels 5 are

permanently allocated to one another via the data line 12. The associated signaling channels 6 are connected to a controller (CtD controller - click to dial controller) 10. In the embodiment shown, this controller is one of the controllers already existing in the transit exchange 3 for controlling the transit exchange 3 itself. The controller 10 is connected to a network server 13 via a junction line 11. The network server 13 can then be connected to another communication network, for example the Internet. If the network server 13 then receives a request for setting up a connection between the first subscriber 7 and the second subscriber 8, it issues the instruction for this via the junction line 11 to the controller 10. The controller 10 then conducts a control signal to the signaling channel 6 that a connection is present on the information channel 5 connected to the data line 12 which is to be switched through to the first subscriber 7 and which, lastly, is connected via the switching network 1 to the first subscriber. Similarly, a connection is switched from the data line 12 to the second subscriber 8 via the switching network 1 by means of a corresponding control signal on the signaling channel 6. Since the transit exchange 3 sees itself as an adjacent transit exchange via the information channels 5 and the data line 12, the information channels 5 are permanently allocated to one another via the synchronizing devices and methods normally existing between the transit exchanges and transmit the information data. The controller 10 also transmits, on the signaling channel 6, terminal signaling messages coming from the connection to the first subscriber 7 to the connection to the second subscriber 8 and conversely.

Compared with the prior art, the embodiment of the device according to the invention described has the advantage that it can be set up with little expenditure and also subsequently in an existing transit exchange

3. It is only necessary to install the data line 12, to supplement an existing controller by software adaptation to the controller 10 and to set up an interface as junction line 11 to a network server 13. This can also be done by utilizing existing system interfaces to the outside.

Figure 3 shows in a simplified manner a further embodiment according to the invention of the device described above in a transit exchange of the EWSD type.

A transit exchange of the EWSD type consists of a switching network 1 (SN) and at least one line trunk group 2 (LTG). In this case, four are shown, one of which is drawn enlarged and with its modules. The switching network 1 has, for the control function, its own controller, the switch group control 15 (SGC). A line trunk group 2 is built up of line trunk units 17 (DIU,LTU), a group switch 19 and a line interface unit 20. If the line trunk group 2 is designed for PCM30 transmission links as in the embodiment shown, the line trunk group 2 has four line trunk units 17. Each line trunk unit 17 provides a PCM30 access 22 for a transmission link. In each case two of the PCM30 accesses 22 are connected to one another by data lines 12. The group processor 21 is at the same time the signal processor 10. The line trunk units 17 combine the information channels in a group switch 19 (GS). Four 2-MBit PCM lines of 32 information channels each are combined in the group switch 19 to form an 8-MBit line with 128 channels which are forwarded to the switching network 1 via the interface of the line interface unit 20. The connection is set up as already described above. Since the group processor 21 is connected to the processor of the switching network 1, the switch group control 15 and the central processor 16 via internal interfaces, it can be used as controller 10. The software must be appropriately adapted. The instruction for setting up a connection to

the controller 10 can also be transmitted via these interfaces. Using the embodiment described, it is, therefore, possible to establish the device according to the invention by means of two data lines 12 and a software supplement. In particular, subsequent installation in existing transit exchanges EWSD which are used in large numbers is also conceivable.